

***COMPARATIVE STUDY OF DIFFERENT CLOUD FRACTION  
ESTIMATES OVER THE SOUTHERN GREAT PLAINS***

Wei Wu, Yangang Liu, Michael P. Jensen, and Tami Toto

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**Environmental Sciences Department/Atmospheric Sciences Division  
Brookhaven National Laboratory**

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**ABSTRACT**

A variety of observations and retrieval methods have been used to estimate cloud fraction, creating an increasing need to quantify the range of uncertainty in these estimates to facilitate evaluation of model results against observations. Here we use the most recent decade-long surface- and satellite- based cloud fraction estimates over the Southern Great Plains (SGP) region of the United States to investigate the uncertainty in estimation of cloud fraction. Results show significant discrepancy in SGP cloud fraction estimates. Major sources of the discrepancy are examined including variations in the measurement methods and/or retrieval algorithms. In this study, we examine the three cloud fraction estimates from the Atmospheric Radiation Measurement (ARM) programs' Climate Modeling Best Estimate (CMBE) value added products: (1) from surface-based, vertically pointing remote sensing observations (ARSCL: Active Remote Sensing of Clouds), (2) from a surface-based hemispheric imager (TSI – Total Sky Imager), and (3) from geostationary satellite observations (GOES - Geostationary Operational Environmental Satellite). We also employ cloud fraction estimates from hemispheric radiometer observations: the Solar Infrared Radiation Station (SIRS), and three different satellite-based cloud fraction estimates: the International Satellite Cloud Climatology Project (ISCCP), Pathfinder Atmospheres Extended (PATMOS-x), and the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO). These results will be useful for evaluating and improving cloud parameterizations in climate models.

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